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(54) A lamp for construction work using a light source having directivity

(57) Light flux emitted from each of a plurality directional light sources, eg LED (13b) enters each of reflection surfaces (19a, 19b) which are formed inside respective disk-like housings (5a, 5b) made of a transparent plastic material. The light flux is reflected from each reflection surface and becomes two light flux directed in opposing directions. Each of two light flux travels outwardly through each housing.

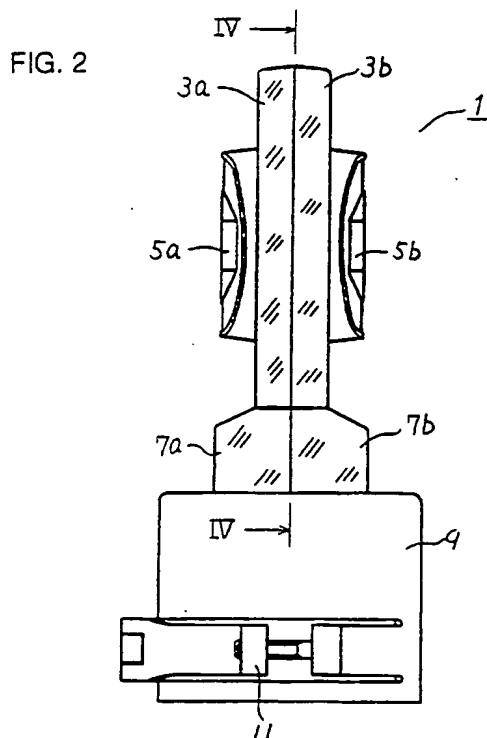
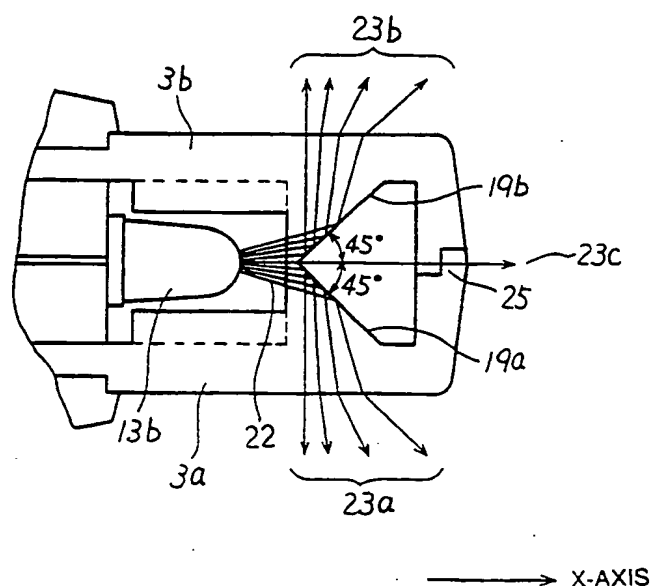


FIG. 5



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FIG. 1

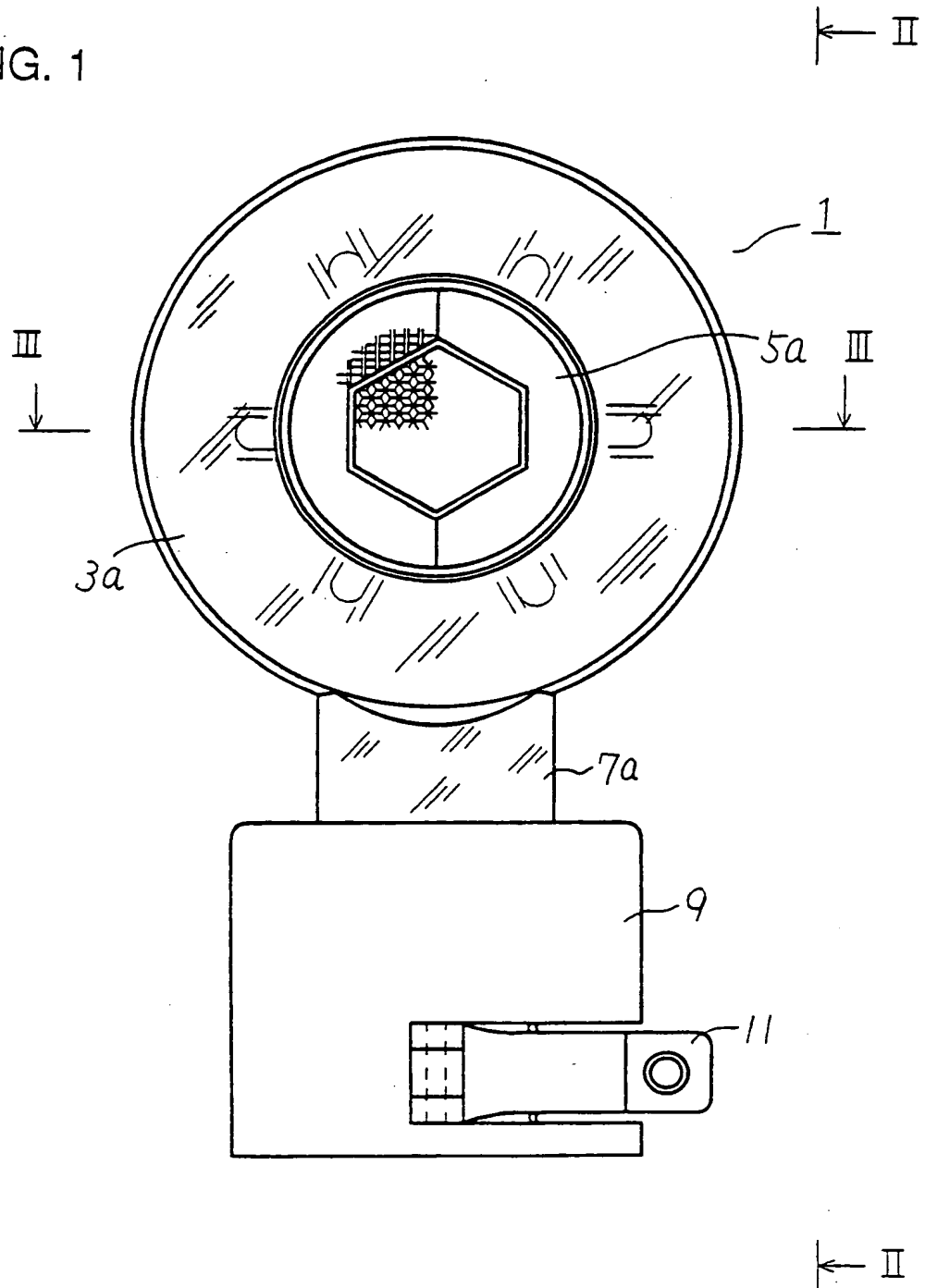


FIG. 2

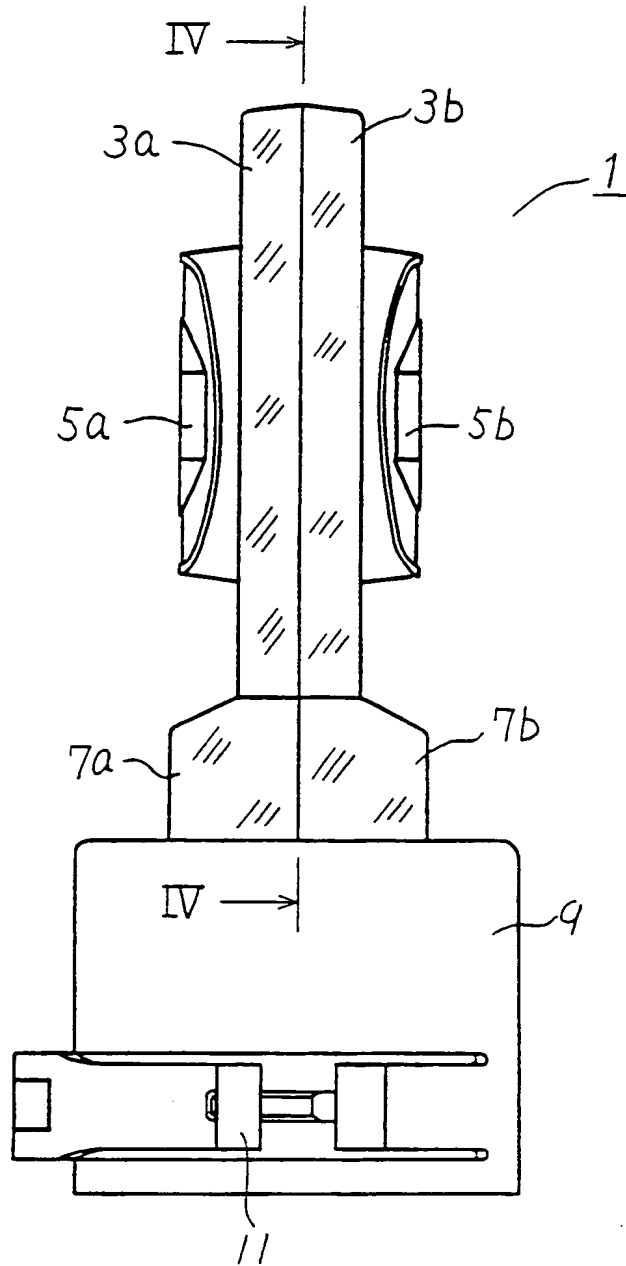


FIG. 3

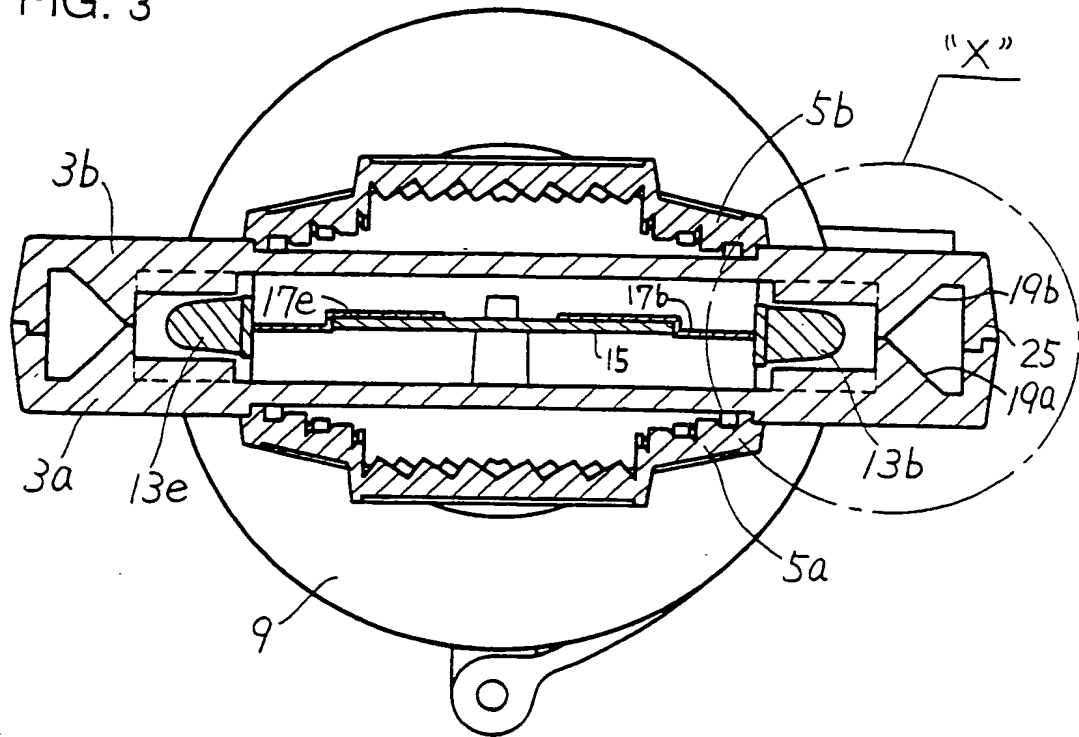


FIG. 4

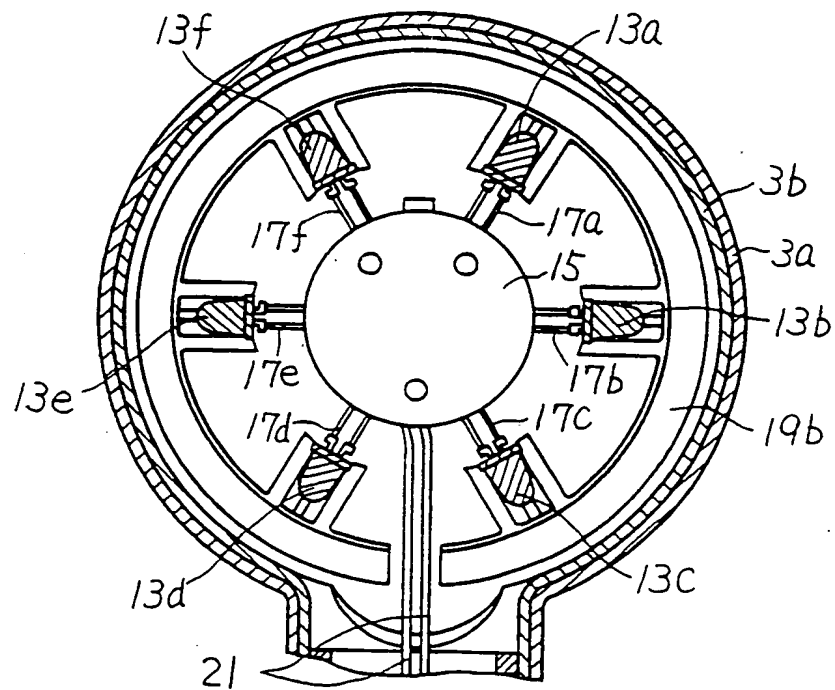


FIG. 5

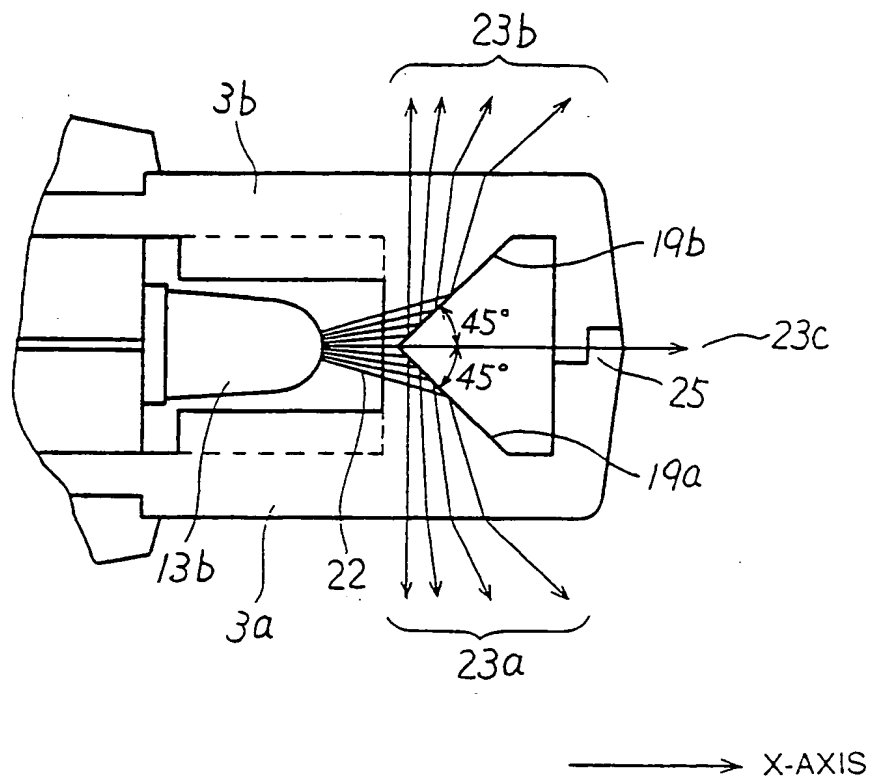


FIG. 6

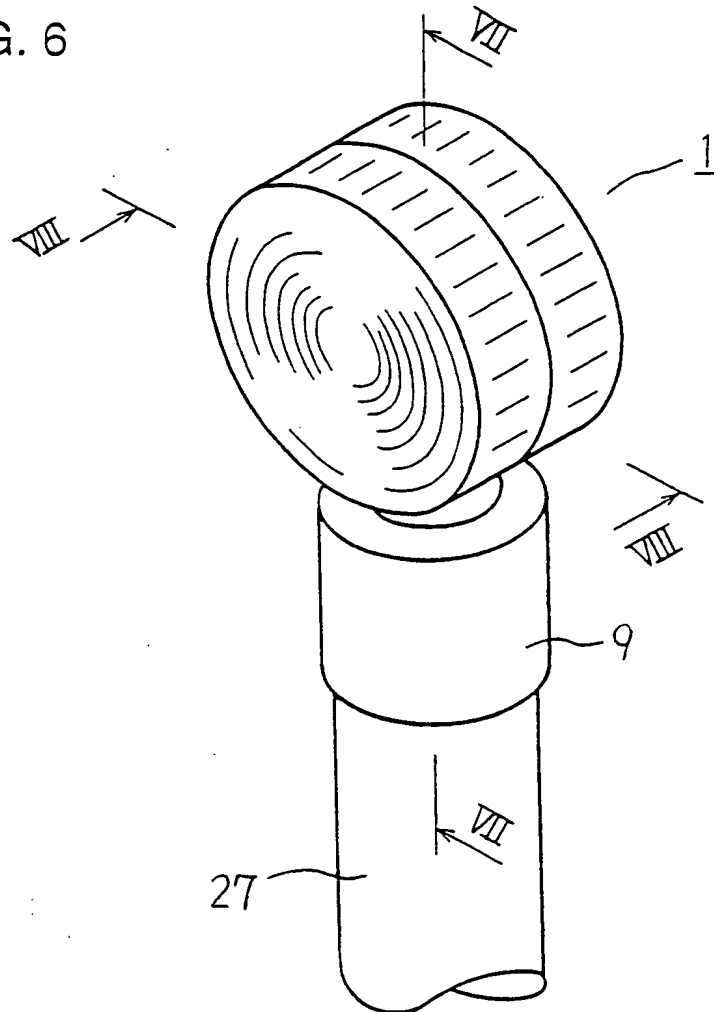


FIG. 7

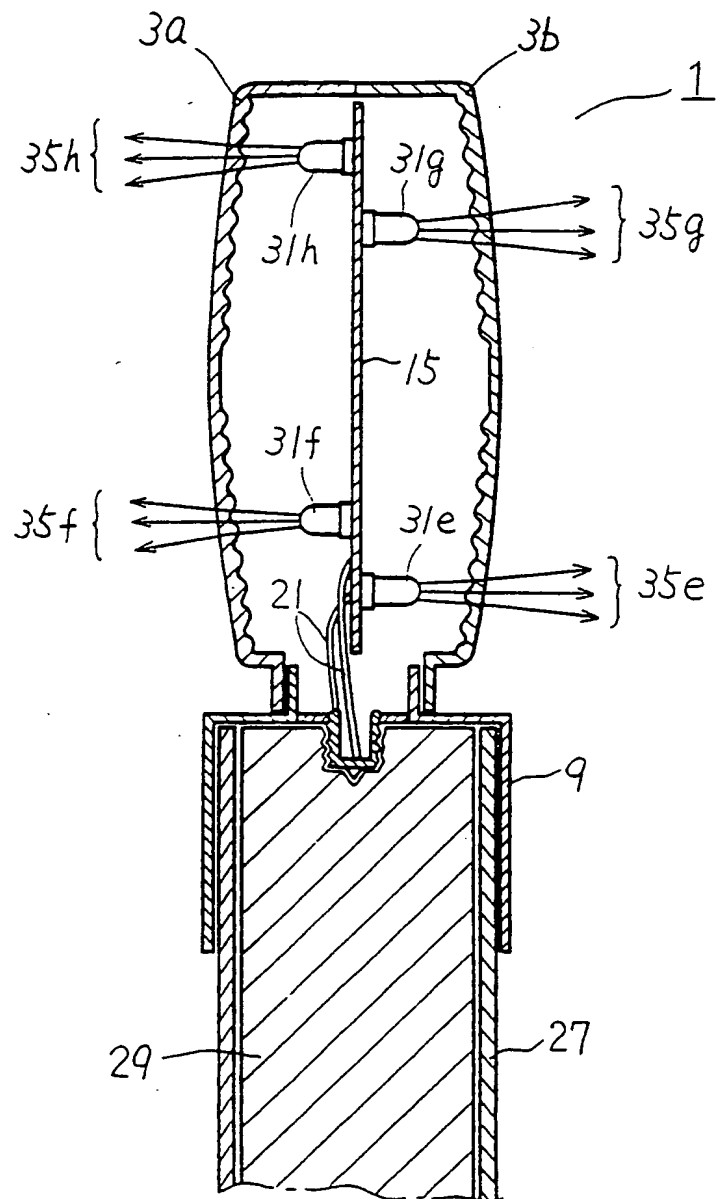
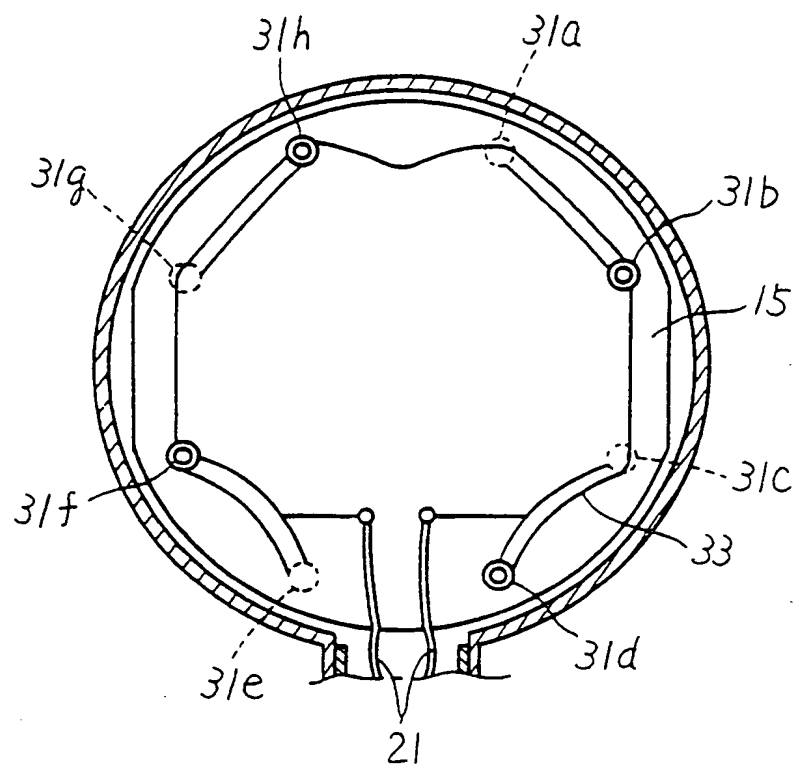


FIG. 8



TITLE OF THE INVENTION

A Lamp for Construction Work Using a Light Source
Having Directivity

BACKGROUND OF THE INVENTION

Field Of the Invention

The present invention relates to a lamp for construction work, and more particularly, it is concerned with a lamp for construction work using a light source having directivity such as an LED (light-emitting diode).

Description of the Background Art

A lamp for construction work is used for notifying drivers and the like of an area where road work is under way as a danger zone. In general, lamps for construction work use a dry battery for road signs as a power supply, and also use an optical sensor to automatically emit a flashing signal as it becomes dark for notifying people of the danger zone. Most conventional lamps for construction work have used light bulbs as the light source, however, these bulbs have problems such as frequent burnout and a large power consumption. Therefore, recently an LED has become more popular.

While burnout is unlikely to occur and the power consumption is small, the LED is dim because of a weak emission amount and a strong directivity of light.

Fig. 6 is an overall perspective view of a

conventional lamp for construction work, Fig. 7 is a cross section viewed from line VII-VII in Fig. 6, and Fig. 8 is a cross section viewed from line VIII-VIII of Fig. 6.

With reference to these figures, a lamp for construction work 1 is mounted by fixing a cap 9 which is provided in the lower part of the lamp to a pole for construction work 27. A battery 29 is attached under cap 9 for supplying an electric power to each of LED 31a-31h through codes 21. LED is provided on both sides of a board 15. More specifically, LED 31a, 31c, 31e, 31g are provided on the right surface, and LED 31b, 31d, 31f, 31h are provided on the left surface of board 15 in Fig. 7. Each LED is connected with each other by a printed wiring provided on board 15. By flashing each LED for each surface of board 15, light is emitted outwardly through housings 3a and 3b which are made of transparent plastic. As can be seen in Fig. 7, LED 31g and 31e emit light flux 35g and 35e to irradiate the right side of the drawing, while LED 31h and 31f emit light flux 35h and 35f to irradiate the left side of the drawing. Therefore, a degree of visual recognition of the lamp for construction work from both sides is improved.

In the above-described conventional lamp for construction work, it is necessary to provide LED on both sides of the board in order to direct light in both

directions of the lamp because LED has directivity. Thus, many LED are required, which is less cost-effective.

In the meanwhile, if the battery is burn out during night time, LED stops flashing so that it cannot carry out its original function as the lamp for construction work. Therefore the degree of visual recognition of the lamp is degraded, thus decreasing safety of drivers and the like.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a cost-effective lamp for construction work.

Another object of the present invention is to provide a lamp for construction work which gives a high degree of visual recognition.

Still another object of the present invention is to provide a lamp for construction work which uses efficiently light emitted from a light source having directivity.

Still another object of the present invention is to provide a lamp for construction work which can be recognized visually even when no light is emitted from light source.

In order to achieve these objects, a lamp for construction work in one aspect of the present invention emits light at least in two directions for warning, and includes a light source which emits light having

directivity, a housing which is made of a transparent material and covers the light source, and a light flux generating means for changing a proceeding direction of the light emitted from the light source and generating at least two light flux which are directed in opposing directions.

In the thus formed lamp for construction work, at least two light flux which are directed in opposing directions are generated from the light emitted from one light source, so that the overall number of light sources can be reduced, and a manufacturing cost can be reduced.

In order to achieve the above objects, a lamp for construction work in another aspect of the present invention includes a light source capable of repeatedly flashing, a housing which is made of a transparent material and covers the light source, and a reflector which is provided in part of the housing for reflecting light entered from the outside.

Since the light entered from the outside is reflected from the reflector, the thus formed lamp for construction work can show its existence to drivers and the like during night time even when the light source does not flash, thus improving the degree of visual recognition.

25 The foregoing and other objects, features, aspects and advantages of the present invention will become more

apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view of a lamp for construction work according to one embodiment of the present invention.

Fig. 2 is a side view when seen from line II-II of Fig. 1.

Fig. 3 shows a structure of a cross section viewed from line III-III of Fig. 1.

Fig. 4 shows a structure of a cross section viewed from line IV-IV of Fig. 2.

Fig. 5 is an enlarged view showing a structure of "X" portion of Fig. 3.

Fig. 6 is an overall perspective view of a conventional lamp for construction work.

Fig. 7 shows a structure of a cross section viewed from line VII-VII of Fig. 6.

Fig. 8 shows a structure of a cross section viewed from line VIII-VIII of Fig. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 is a front view of a lamp for construction work according to one embodiment of the present invention, and Fig. 2 is a side view thereof when seen from line II-II of Fig. 1.

With reference to these drawings, a lamp for construction work 1 is provided such that circular lid-like housings 3a and 3b made of a red transparent plastic material are connected together, and reflectors 5a and 5b are attached to the center portion of each housing for reflecting light entered from the outside. Cylindrical supports 7a and 7b are connected to the bottom of housings 3a and 3b and a cylindrical cap 9 having a band 11 for attaching to the pole for construction work is provided under the supports.

Fig. 3 is a cross section viewed from line III-III of Fig. 1, and Fig. 4 is a cross section viewed from line IV-IV of Fig. 4.

With reference to these drawings, in the center of disk-like housings 3a and 3b is provided a disk-like printed board 15. LED 13a-13f are provided radially about printed board 15, and each terminal 17a-17f is secured to printed board 15. As can be seen in the figure, an electric power is supplied to board 15 through cords 21, and terminals 17a and 17f are connected with each other by a printed board (not shown) formed on board 15. Thus, light emitted from each of LED 13a-13f is directed in a radial direction about printed board due to its directivity. Also, a ring-like space having a triangular-shaped cross section which is formed by reflection

surfaces 19a and 19b and a cylindrical circumferential wall 25 is provided on the entire outer periphery of housings 3a and 3b.

Fig. 5 shows "X" portion of Fig. 3 in an enlarged manner, wherein hatching showing cross sectional regions is omitted for clear understanding.

Referring to this figure, traveling directions of light flux 22 emitted from LED 13b will be described below.

Light 22 having directivity which is emitted from LED 13b enters housing 3a and 3b made of transparent material and reaches reflection surfaces 19a and 19b respectively. Since reflection surfaces 19a and 19b are formed at an inclination angle of 45° with respect to the x-axis, the entered light flux are reflected therefrom to make light flux 23a and 23b and proceed outwardly to the left and to the right with respect to the x-axis. Thus, the light flux emitted from LED 13b is recognized from both sides of housings 3a and 3b. In the meanwhile, the light flux emitted from LED 13b in a direction parallel to the x-axis is not reflected from reflection surface 19a and 19b but proceeds outwardly through peripheral wall 25 as a light flux 23c. Consequently, in the lamp for construction work according to one embodiment of the present invention, the light flux emitted from LED can be recognized visually

from all directions.

Although LED has been used as the light source in the above embodiment, any light source having a light directivity can be used instead of LED to provide a similar effect.

Also, reflectors are provided in the center portion of the lamp in the above embodiment, however, the light flux emitted from LED can be dispersed in the same manner in case of no reflectors.

Further, the lamp for construction in the above embodiment includes reflectors, however, only these reflectors can be attached to the lamp for construction light shown in Fig. 6, for example, as in the conventional example to assure improvement of the degree of visual recognition of the lamp.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

CLAIMS

1. A lamp for construction work which emits light at least in two directions for warning, comprising:

a light source which emits light having directivity;

a housing which is made of a transparent material and covers said light source; and

a light flux generating means provided within said housing for changing a traveling direction of the light emitted from said light source and generating at least two light flux directed in opposing directions.

2. The lamp for construction work according to claim 1, wherein

said light flux generating means is made of a transparent material for reflection and is connected to said housing, and said transparent material for reflection includes a pair of reflection surfaces each of which is formed at an inclination angle of 45° from a central axis of a traveling direction of the light emitted from said light source.

3. The lamp for construction work according to claim 2, wherein

a portion of light emitted from said light source and

traveling along said central axis is directed outwardly from said housing without being reflected from said reflection surface.

4. The lamp for construction work according to claim 3, wherein

said light source includes a plurality of LED which emit light radially about a predetermined point.

5. The lamp for construction work according to claim 4, wherein

said housing includes

a first disk disposed in parallel with a plane in which said LED is arranged,

a second disk disposed in a plane parallel to a plane in which said LED is arranged and sandwiching said LED with said first disk, and

a sidewall having a cylindrical shape for enclosing the periphery of said first disk and the periphery of said second disk.

6. The lamp for construction work according to claim 5, wherein

each of said two light flux reflected from said reflection surface is directed outwardly through each of

said first and second disks.

7. The lamp for construction work according to claim 6, wherein

said light flux generating means is formed between each said LED and said sidewall.

8. The lamp for construction work according to claim 7 further includes

a reflector which is attached to an outer surface of each of said first and second disks for reflecting light entered from the outside.

9. A lamp for construction work, comprising:

a light source capable of repeatedly flashing;

a housing which is made of a transparent material and covers said light source; and

a reflector which is attached to a part of said housing for reflecting light entered from the outside.

10. The lamp for construction work according to claim 9, wherein

said housing includes a first disk, a second disk located parallel to a surface of said first disk, and a cylindrical sidewall enclosing the periphery of said first

and second disks, and

said reflector is attached to an outer surface of each of said first and second disks.

11. The lamp for construction work according to claim 10, wherein

beams of light emitted from said light source in one direction are dispersed in the opposing directions, and each of said dispersed beams of light are directed outwardly through each said first and second disks.

12. A lamp for construction work as claimed in claim 1 substantially as hereinbefore described with reference to the accompanying drawings.

Relevant Technical Fields

- (i) UK Cl (Ed.M) F4R (RAL, RCM, RFN, RL)
 (ii) Int Cl (Ed.5) B60Q 7/00; F21Q 3/00

Databases (see below)

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.
 (ii) ONLINE DATABASES: WPI, CLAIMS, EDOC, WPIL

Search Examiner
 A J RUDGE

Date of completion of Search
 12 OCTOBER 1994

Documents considered relevant
 following a search in respect of
 Claims :-
 ALL

Categories of documents

- | | |
|---|---|
| X: Document indicating lack of novelty or of inventive step. | P: Document published on or after the declared priority date but before the filing date of the present application. |
| Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. | E: Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| A: Document indicating technological background and/or state of the art. | &: Member of the same patent family; corresponding document. |

Category	Identity of document and relevant passages	Relevant to claim(s)
X	US 4912610 (RAYTECH) see Figure 3 items 4, 7, 8 and M	1

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